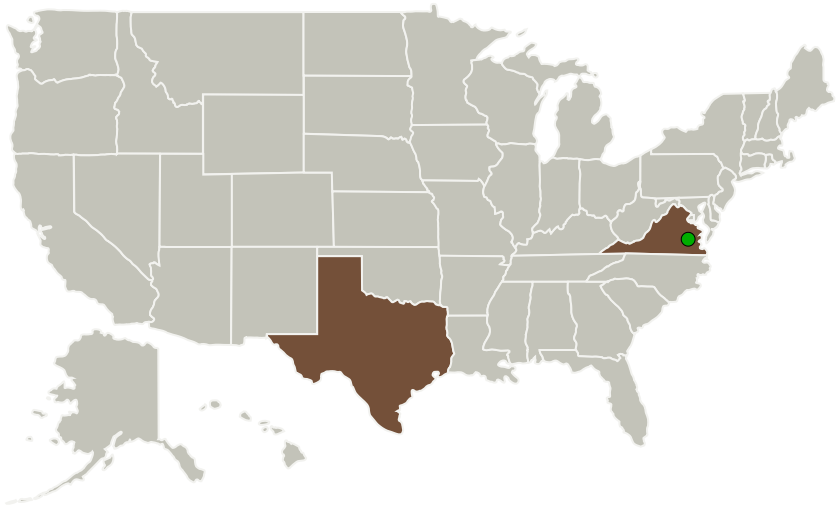
Integrated Miniature DBR Laser Module for Lidar Instruments, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

We propose to demonstrate a compact integrated laser module structure that addresses the requirements of the laser source in a water vapor differential absorption Lidar (DIAL) system. Our approach, with the development of the high performance DBR laser diode and the engineering of miniature integration technology, will provide narrow line-width and high power laser modules for numerous Lidar applications with the advantages of reduced size, weight and power (SWaP). Under this Phase I SBIR program we would demonstrate the operation of the compact integration laser modules, both on an optical bench and in a miniature housing, with output line-width and power at desired levels. In the Phase II program, Photodigm will continue to build the laser modules into compact, hermetic packages to achieve high reliability and manufacturability. The laser modules will be further integrated with monolith or discrete master oscillator (MO) power amplifier (PA) designs suitable for the next-generation Lidar instruments.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Photodigm, Inc.	Lead Organization	Industry	Richardson, Texas
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

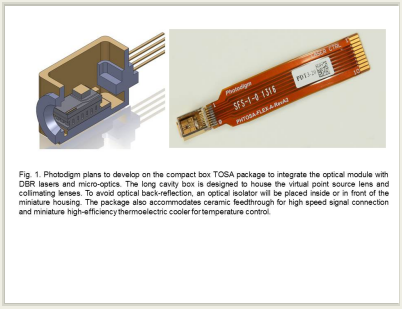


Fig. 1. Photodigm plans to develop on the compact box TOSA package to integrate the optical module with DBR lasers and micro-optics. The long cavity box is designed to house the virtual point source lens and collimating lenses. To avoid optical back-reflection, an optical isolator will be placed inside or in front of the miniature housing. The package also accommodates ceramic feedthrough for high speed signal connection and miniature high-efficiency thermoelectric cooler for temperature control.

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Table of Contents

Integrated Miniature DBR Laser Module for Lidar Instruments, Phase I

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Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

June 2015: Project Start

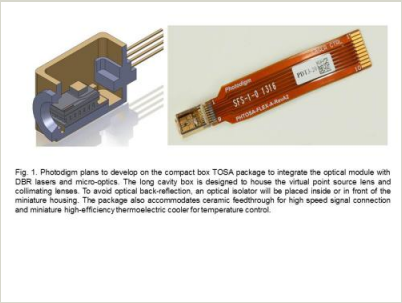
December 2015: Closed out

Closeout Summary: Integrated Miniature DBR Laser Module for Lidar Instrume nts, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139004)*

Images



Briefing Chart Image
Integrated Miniature DBR Laser Module for Lidar Instruments, Phase I
(https://techport.nasa.gov/image/133941)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Photodigm, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

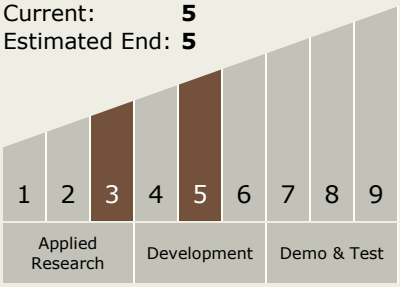
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Annie Xiang

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System